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Why Policies Fail: The Independent Effects of Industrial Policy and Trade Openness on Structural Transformation in Nigeria, 1986–2023

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Abstract:

- ***Purpose:***

This study aims to examine the independent effects of industrial policy and trade openness on structural transformation in Nigeria for the period 1986-2023, and to offer empirical evidence on how each policy variable drives or constrains structural transformation in an emerging African economy.

- ***Methodology:***

The annual time series data for the period 1986-2023 were used. The ratio of manufacturing to agricultural value added was used for measuring ST. Government spending on manufacturing subsidies (GSM) was used to proxy industrial policy (IPol), and trade openness (TO) was measured as the ratio of trade to GDP. Some control variables included were agricultural productivity and inflation. The autoregressive distributed lag (ARDL) bounds testing approach of Pesaran, Shin and Smith (2001) was employed and two distinct model specifications were used to allow the independent contribution of each policy variable. Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root tests were performed to ensure stationarity properties and diagnostic tests such as Breusch-Godfrey LM test, heteroskedasticity tests and CUSUM stability tests were used to verify the estimated model properties.

- ***Findings:***

There is a strong negative long-run association between industrial policy and structural transformation ($\beta = -38.49$; $p < 0.01$), indicating that economic policy implementation is not only about coordination but also about basic implementation failure. The long-run effect of trade openness on structural transformation is negligible ($\beta = -0.30$, p value 0.05), meaning that in 39 years of trade liberalisation, there has been no effect. In both model specifications, agricultural productivity has a significant long-run negative effect on structural transformation, suggesting strong and persistent labour mobility restrictions. These lagged effects are positive for industrial policy and modest positive effects are seen with trade openness, with a time lag of two to three years, but neither are able to overcome the structural inertia in the long-run. Both models of error correction mechanisms show quick convergence to equilibrium, the industrial policy model convergence rate is 97.1% per annum, and the trade openness model is 144.4% per annum.

- ***Originality:***

This study provides the first dual-model ARDL analysis isolating the independent effects of industrial policy and trade openness on structural transformation in Nigeria over the full SAP-to-AfCFTA policy cycle (1986–2023). It contributes to the literature by demonstrating that policy ineffectiveness in Nigeria is systemic rather than sector-specific, and that agricultural productivity rigidity, not trade exposure, is the dominant structural constraint on manufacturing-led transformation.

Keywords: *Industrial Policy, Trade Openness, Structural Transformation, ARDL, Nigeria.*

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I. INTRODUCTION

➢ *Background and Problem Statement*

Structural transformation, defined as the progressive reallocation of labour and productive resources from low-productivity activities, principally agriculture, towards higher-productivity sectors such as manufacturing and services, is widely regarded as the defining feature of successful economic development (Markaki & Papadakis, 2023; Timmer & Akkus, 2008). It has a solid theoretical basis: the classical dual economy theory of Lewis (1954) and the structuralist theory of Hirschman (1958) both argued that industrial growth, with a focus on manufacturing, is the mechanism through which structural change occurs. However, in reality, the routes to transformation are quite different from country to country, and the effectiveness of intentional policy moves for directing the transformation remains a topic of debate.

There are two classes of policy intervention in the middle of this debate. First, industrial policy is based on the assumption that the state can address market failures and to coordinate investment in sectors that have strong growth potential, which requires government interventions such as targeted spending, subsidies, local content policies and sectoral incentives (Lin, 2011; Rodrik, 2014). Second, tariff liberalisation, trade agreements and export subsidies are the instruments used to increase trade openness, which are based on the assumption that opening to the international markets boosts competition, technology transfer and productivity growth, which in turn drives structural change (Andreoni, 2016; Grossman & Helpman, 1994).

The context of Nigeria is particularly informative of these assertions. The nation has experienced a continuous progression of import substitution industrialisation (ISI) policies, followed by the broad-ranging policy of liberalisation initiated by the Structural Adjustment Programme (SAP) in 1986, the post-SAP industrial incentive schemes and, since 2020, membership in the African Continental Free Trade Area (AfCFTA). However, the impact of this diverse policy trajectory has been a manufacturing sector that has shrunk from 20.50% of GDP in 1986 to 10.89% in 2023 (National Bureau of Statistics [NBS] 2024), a tertiary sector that has grown to 58.37% of GDP, albeit without the expected industrialisation, and the primary sector that has stubbornly refused to budge from its position of around 22.9% of GDP. The shift is a reversal of the "stylised" process of structural change, where the primary sector shrinks, the secondary sector grows, and the tertiary sector grows to complement the secondary, rather than taking its place.

Previous studies have focused on the individual impact of industrial policy and trade liberalisation on structural outcomes in Nigeria (Umoru & Eborieme, 2013; Akinlo et al, 2021; Atoyebi et al, 2023; Chabi & Saygılı, 2024) and other sub-Saharan African economies, producing a vast but scattered volume of evidence. It is important to note that the literature does not include a dual-model framework that separately estimates the long-run and short-run effects of each policy variable, while keeping the dependent variable and control structure the same and using the same estimation techniques, so as to allow for a symmetrical assessment of the relative effectiveness of each. This study closes that gap by using two different ARDL specifications, one for industrial policy and one for trade openness, that are estimated on the long-term horizon from 1986 to 2023.

The rest of this paper is structured as follows. In Section 2, the relevant theoretical and empirical literature is explored. The data, variables, and econometric methodology are presented in Section 3. The results of the empirical studies and their interpretation are provided in Section 4. The findings are discussed in the light of the existing literature in section 5, and policy implications are drawn in section 6.

II. LITERATURE REVIEW

➢ *Conceptual Framework*

Structural transformation refers to the relocation of resources between sectors due to the productivity differentials, shifts in the factor endowments and shifts in consumer demand (Timmer & Akkus, 2008). It is marked by declining agricultural contribution to GDP and employment, growing industry, especially manufacturing, and growth of services. Most importantly, it does not arise naturally; it needs to be designed by policy to overcome the structural barriers such as lack of investment, poor infrastructure, and low technological capacity (Lin, 2011; Mamba et al., 2020).

Industrial policy is defined as the government's policy to promote high-growth potential industries, for example, subsidies, infrastructure construction, local content preference, tax breaks, etc. (Chen & Xie, 2019). The backward and forward linkages of Hirschman (1958) continue to form the basis of the logic of industrial policy: that is, if governments are able to invest strategically in selected sectors, then they can engender positive multiplier effects throughout the economy. Industrial policy, on the other hand, complements trade openness, which links domestic industries with global markets, by bringing domestic companies into competition with other companies and technologies from abroad and by facilitating participation in global value chains (Andreoni, 2016). These two policy instruments interact in a way that could, at least in theory, produce two mechanisms to accelerate structural transformation.

➢ *Theoretical Literature*

The Neo-Classical Growth framework (Solow, 1956) assumes that the market is an efficient reallocator of resources

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towards higher productivity uses and that openness to trade fosters technology diffusion. It gives a small place to industrial policy; however, other than providing enabling conditions. In Nigeria, this model suggests that the increased liberalisation that followed SAP should have spurred reallocation within the economy, but the data indicate the opposite trend, namely that the manufacturing sector shrank while import growth reduced the domestic supply (Akinlo et al., 2021; Umoru & Eborieme, 2013).

According to the Big Push Theory (Rosenstein-Rodan, 1943, 1961), a coordinated large-scale public investment is required to generate the complementarities and demand externalities necessary to break out of underdevelopment traps. This thinking is evident in Nigeria's ISI strategies and the Economic Recovery and Growth Plan (ERGP) of 2017, but much of the policy incoherence has hindered the achievement of desired multiplier effects (Bakre & Ojugbele, 2020; Mamba et al., 2020). In addition, structuralist economics (Hirschman, 1958) suggests that, if trade isn't deliberately structured to link the extractive and manufacturing sectors, openness will actually extend the dominance of the primary sector. Similarly, Strategic Trade Theory (1986, Krugman) cautions against unprotected importing in economies that are in the early stages of industrial development, in this case, Nigeria.

➢ *Empirical Literature*

The experience of Nigeria on industrial policy and structural change is negative. Akinlo et al. (2021) pointed out that the major causes of Nigeria's industrial slowness were policy incoherence and weak linkages within and between sectors, whereas Madichie, Osagu, and Eze (2018) reported on the dominance of the extractive sector in the country and the poor performance of manufacturing in terms of employment generation. Omotayo and Odeleke (2022) attributed 3% decline in manufacturing to coordination failures, and Andreoni et al. (2021) noted that the National Industrial Revolution Plan (NIRP) exacerbated a 9% fall in manufacturing's GDP share due to inadequate implementation and the lack of supporting infrastructure. In contrast, Krueger (2020) and Bakre and Ojugbele (2020) point out how markedly more successful industrial policy regimes have been in the East Asian economies, where industrial policy has been explicitly targeted at manufacturing and institutional coherence has ensured that such policies have been sustained over time.

The picture is also not entirely clear on the issues of trade openness and structural transformation, but overall, it is not promising for Nigeria. In a recent study, Gandjon-Fankem and Feyom (2024) found that trade liberalisation has hurt industrialisation in sub-Saharan Africa, with open economies experiencing up to a 15% decline in manufacturing. The Nigerian manufacturing sector lost 10% of its output due to import surges after liberalisation (Adegoke et al., 2020), and manufacturing productivity in West African economies that were exposed to unprotected trade competition was lost by 7% (Chabi and Saygılı, 2024). In contrast, Kaba, Lin and Renard (2022) and Emako, Nuru and Menza (2022) found positive structural transformation effects in other Sub-Saharan countries with complementary industrial policies and policies for trade openness. The fact that these contrasting results exist indicates that the impacts of trade openness are contingent on the institutional and policy frameworks within which the trade openness is implemented, but Nigeria has not fulfilled this precondition.

III. METHODOLOGY

The Autoregressive Distributed Lag (ARDL) bounds testing approach of Pesaran, Shin, and Smith (2001) is adopted for two independent model specifications. The ARDL framework is particularly suited to the present analysis for three reasons: it accommodates variables integrated of different orders I(0) and I(1) without requiring all series to be integrated of the same order; it performs robustly with small sample sizes (n = 38); and it simultaneously estimates long-run and short-run dynamics through a single equation, avoiding the information loss associated with first-differencing methods (Pesaran et al., 2001).

Model 1 isolates the independent effect of industrial policy on structural transformation, controlling for agricultural productivity and inflation:

Equation 1 below shows the independent role of IPol on ST:

$$ST_t = f(logIPol_t, logAgPRO_t, INF_t) \quad (1)$$

Equation 2 below shows the long-run and short-run relationship between ST and IPol

$$ST_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta ST_{t-i} + \sum_{i=0}^{q} \beta_{2i} \Delta logIPol_{t-i} + \sum_{i=0}^{r} \beta_{3i} \Delta logAgPRO_{t-i} + \sum_{i=0}^{w} \beta_{4i} \Delta INF_{t-i} + \delta_1 ST_{t-1} + \delta_2 logIP_{t-1} + \delta_3 logAgPRO_{t-1} + \delta_4 INF_{t-1} + \varepsilon_t \quad (2)$$

Upon confirming cointegration, equation 3 below is the long-run model;

$$ST_t = \theta_0 + \theta_1 IPol_{t-1} + \theta_2 logAgPRO_{t-1} + \theta_3 INF_{t-1} + \mu_t \quad (3)$$

The Error Correction Model (ECM) capture short-run dynamics in equation 4

$$\Delta ST_t = \varphi_0 + \sum_{i=1}^{p} \varphi_{1i} \Delta ST_{t-i} + \sum_{i=0}^{q} \varphi_{2i} \Delta IPol_{t-i} + \sum_{i=0}^{r} \varphi_{3i} \Delta logAgPRO_{t-i} + \sum_{i=0}^{w} \varphi_{4i} \Delta INF_{t-i} + \lambda ECM_{t-1} + v_t \quad (4)$$

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Model 2 isolates the independent effect of trade openness on structural transformation, with the same control variables:

Equation 5 below shows the independent role of TO on ST:

$$ST_t = f(TO_t, logAgPRO_t, INF_t) \quad (5)$$

Equation 6 below shows the long-run and short-run relationship between ST and TO

$$ST_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta ST_{t-i} + \sum_{i=0}^{q} \beta_{2i} \Delta TO_{t-i} + \sum_{i=0}^{r} \beta_{3i} \Delta logAgPRO_{t-i} + \sum_{i=0}^{w} \beta_{4i} \Delta INF_{t-i} + \delta_1 ST_{t-1} + \delta_2 TO_{t-1} + \delta_3 logAgPRO_{t-1} + \delta_4 INF_{t-1} + \varepsilon_t \quad (6)$$

Upon confirming cointegration, equation 3.7 below is the long-run model;

$$ST_t = \theta_0 + \theta_1 TO_{t-1} + \theta_2 logAgPRO_{t-1} + \theta_3 INF_{t-1} + \mu_t \quad (7)$$

The Error Correction Model (ECM) capture short-run dynamics in equation 8

$$\Delta ST_t = \varphi_0 + \sum_{i=1}^{p} \varphi_{1i} \Delta ST_{t-i} + \sum_{i=0}^{q} \varphi_{2i} \Delta TO_{t-i} + \sum_{i=0}^{r} \varphi_{3i} \Delta logAgPRO_{t-i} + \sum_{i=0}^{w} \varphi_{4i} \Delta INF_{t-i} + \lambda ECM_{t-1} + v_t \quad (8)$$

Upon confirming cointegration via the ARDL bounds test, the long-run equilibrium relationship and short-run dynamics are estimated through the Error Correction Model (ECM). The speed of adjustment coefficient λ (CointEq(-1)) is expected to be negative and statistically significant, confirming convergence to long-run equilibrium following a disturbance. Model robustness is verified through the Breusch-Godfrey Serial Correlation LM test, the Breusch-Pagan-Godfrey heteroskedasticity test, and the CUSUM and CUSUM of Squares stability tests of Brown, Durbin, and Evans (1975).

IV. MATERIALS AND METHODS

This study employs annual time series data spanning 1986 to 2023, capturing 38 observations across the SAP era (1986–1999), the post-liberalisation reform phase (2000–2014), and the regional and global integration phase (2015–2023). The dependent variable, Structural Transformation (ST), is measured as the ratio of manufacturing value added (MVA) to agricultural value added (AgVA), following the conceptualisation of Timmer and Akkus (2008) and consistent with Akinlo et al. (2021). This ratio captures the relative productive weight of manufacturing vis-à-vis agriculture and rises as the economy transforms.

Industrial Policy (IPol) is proxied by the natural logarithm of government expenditure on manufacturing subsidies in millions of Naira, sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin (2024). Trade Openness (TO) is measured as the trade-to-GDP ratio, obtained from the World Bank World Development Indicators (WDI, 2024). Control variables include the natural logarithm of Agricultural Productivity (AGPRO), sourced from the NBS (2024), and the Inflation Rate (INF), obtained from the CBN Statistical Bulletin (2024).

V. RESULTS

A. *Descriptive Statistics*

Descriptive statistics of Models 1 and 2 are shown, respectively, in Table 1. The high standard deviation (SD = 33.44) and the mean of structural transformation (ST = 59.45) indicate that Nigeria's structural change was very volatile over the study period, pointing towards a dynamic but ultimately stagnant structural change. All variables shown have means and medians within their minimum-maximum limits, providing a consistency check of the data.

Despite the differing emphases of administrations, industrial policy (IPol) has a fairly low standard deviation (0.76) and a fairly stable mean (8.19) across the study period. The correlation coefficient for inflation (INF) is 19.31, with a high standard deviation of 16.71, which further shows the macroeconomic volatility experienced in the post-SAP period in Nigeria. The Jarque-Bera statistics reveal that ST and INF significantly differ from normality, as do macroeconomic series with structural breaks, while the remaining variables do not differ significantly from normality at the 5% level of significance.

Trade openness (TO) has been relatively moderate and fluctuated within a small band around the mean (std. dev. = 3.79) in Nigeria compared with the high-growth East Asian economies as the mean is 25.62% of GDP. The agricultural sector, which is one of the pillars of the economy in Nigeria, has remained a constant feature in the economy with a moderate standard deviation of 1.96 and a mean of 2.15 (AGPRO).

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Table 1 Descriptive Statistics: Model 1 and 2

	ST	IPol	TO	INF	AGPRO
Mean	59.453	8.186	25.620	19.312	2.152
Median	40.395	8.035	26.800	12.945	2.381
Maximum	133.490	9.520	30.600	72.840	3.288
Minimum	27.420	7.130	17.850	5.380	0.456
Std. Dev.	33.438	0.760	3.791	16.714	0.850
Skewness	0.959	0.474	-0.628	1.818	-0.548
Kurtosis	2.487	1.907	2.195	5.232	2.013
Jarque-Bera	6.245	3.316	3.435	28.808	3.445
Probability	0.044	0.191	0.180	0.000	0.179
Observations	38	38	38	38	38

ST = Structural Transformation; IPol = Industrial Policy; TO = Trade Openness; INF = Inflation; AGPRO = Agricultural Productivity.
Source: Author's Computation (2026).

B. Unit Root Tests

The Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root tests were conducted under three specifications, constant only, constant and trend, and without constant and trend, at both level and first difference for all variables in both model specifications. Table 2 presents the PP results for Model 1. Inflation (INF) is stationary at level I(0) under the constant-only specification in both PP and ADF tests. Agricultural productivity (LOGAGPRO) is similarly stationary at the level under the constant-only PP specification. The remaining variables, structural transformation (ST) and industrial policy (LOGIPol), are non-stationary at the level but become stationary at first difference I(1) across all specifications.

The results from the ADF are consistent with the PP results with respect to both model specifications and the robustness of the identified integration orders. The presence of both I(0) and I(1) variables again confirms the suitability of the ARDL bounds testing approach, which is particularly developed for the presence of mixed order of integration. The unit root tests for Model 2 produce similar outcomes, showing that TO and ST are integrated of order one I(1), and INF is stationary at level I(0), with the ARDL framework being appropriate for both specifications.

Table 2 Unit Root Test Results: Phillips-Perron (PP)

UNIT ROOT TEST TABLE (PP): AT LEVEL I(0)							
Variable	**With Constant**		**With Constant & Trend**		**Without Constant & Trend**		
	t-Stat	**Prob.**	**t-Stat**	**Prob.**	**t-Stat**	**Prob.**	**Result**
ST	-1.1850	0.6706	-1.2795	0.8775	-1.9723	0.1477	n0
LOGIPol	0.4829	0.9838	-1.7282	0.7184	4.3794	1.0000	n0
TO	-1.8649	0.3444	5.6541	1.0000	0.2024	0.7393	n0
INF	-2.9661	0.0476**	-3.3087	0.0806*	-1.3706	0.1554	I(0)
LOGAGPRO	-3.7487	0.0072***	-1.3312	0.8642	2.9152	0.9987	I(0)
AT FIRST DIFFERENCE I(1)							
d(ST)	-5.7752	0.0000***	-11.3847	0.0000***	-5.4246	0.0000***	I(1)
d(LOGIPol)	-5.7642	0.0000***	-5.8035	0.0002***	-4.1967	0.0001***	I(1)
d(TO)	-2.8974	0.0558*	-4.9557	0.0016***	-2.9357	0.0045***	I(1)
d(INF)	-6.6385	0.0000***	-6.4059	0.0000***	-6.9393	0.0000***	I(1)
d(LOGAGPRO)	-4.1692	0.0024***	-4.5022	0.0051***	-2.6227	0.0102**	I(1)

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%; (n0) Not Significant. d() Denotes First Difference.
Source: Author's Computation (2026).

C. Model 1: Industrial Policy and Structural Transformation

➢ *Cointegration Results*

Table 3 shows the results of the ARDL bounds test for Model 1. The computed F-statistic value of 33.37005 with three regressors (k = 3) is significantly greater than the upper bound critical value at all the conventional significance levels: 4.45 at 10%, 5.07 at 5%, 5.62 at 2.5% and 6.36 at 1% respectively. This F-statistic is more than five times the most stringent upper bound of the critical value for cointegration, giving overwhelmingly strong statistical evidence for cointegration. The null hypothesis that there is no long-run relationship between structural transformation, industrial policy, agricultural productivity and inflation is soundly rejected.

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Table 3 ARDL Bounds Test

Bounds Test Result		
F-statistic	33.37005	
No. of Regressors (K)	3	
Pesaran et al. (2001) Critical Values		
Significance	**I(0) Lower Bound**	**I(1) Upper Bound**
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

Source: Author's Computation (2026).

➢ *Long-Run and Short-Run Estimates*

Table 4 presents the long-run coefficient estimates for Model 1. Industrial policy (LOGIPol) exhibits a statistically significant negative long-run relationship with structural transformation at the 1% level (β = -38.49; t = -3.008; p = 0.0094). This counterintuitive finding implies that, over the long-run, a unit increase in the logarithm of industrial policy expenditure reduces structural transformation by approximately 38.49 units. Rather than channelling resources from low-productivity agriculture to high-productivity manufacturing, industrial policy interventions in Nigeria appear to have compounded structural rigidity, consistent with evidence of rent-seeking behaviour, inconsistent policy frameworks, and weak enforcement mechanisms documented by Abiola et al. (2019), Andreoni et al. (2021), and Ogunleye (2017).

Agricultural productivity (LOGAGPRO) registers a highly significant negative long-run coefficient (β = -129.98; t = -9.41; p = 0.0000), indicating that higher agricultural productivity substantially reduces structural transformation. This is consistent with Lewis's (1954) surplus labour model taken in reverse: when agricultural productivity improves, the sector retains labour and capital that would otherwise migrate to manufacturing. This coefficient is very large, revealing that agriculture is indeed a structural force in the economy of Nigeria. The long-run structural transformation trajectories are determined slightly positively by inflation (INF) (β = 0.023; p = 0.7654), but it is not a significant determinant.

The Error Correction Model (ECM) estimates are given in Table 5. The CointEq(-1) coefficient of -0.971080 is negative and statistically significant (t = -12.731; p = 0.0000); this means that roughly 97.11% of the disequilibrium in the process of structural transformation is corrected in one year. This is an unusually fast adjustment speed, which shows the robustness of the cointegration relationship and suggests that policy-induced deviations are not "built in" slowly to the structure of the economy, but are speedily passed on, strengthening the negative structural long-run relationship described above.

Structural transformation shows a positive lagged effect of industrial policy, with D(LOGIPol(-1)) and D(LOGIPol(-2)) showing significant positive coefficients of 30.63 and 20.47, respectively, and D(LOGIPol(-3)) has a significant positive coefficient of 13.05. This effect implies a short-run stimulus impact or importance from industrial policy, similar to a temporary fiscal policy signal, but this short-run positive effect erodes and is reversed in the long-run. The short-run effects of inflation on ST are negative and uniform, and agricultural productivity shows complex, mixed effects in the short-run.

Table 4 Long-Run Estimates

Dependent variable: Structural Transformation (ST)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	441.8075	42.07998	10.49923	0.0000
@TREND	9.476503	0.845969	11.20195	0.0000
LOGIP	-38.48831***	12.79442	-3.008210	0.0094
INF	0.022801	0.074951	0.304206	0.7654
LOGAGPRO	-129.9821***	13.81039	-9.411908	0.0000

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%.
Source: Author's Computation (2026).

Table 5 Error Correction Model Estimates

Dependent Variable: Structural Transformation (ST)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(ST(-3))	-0.288158***	0.040380	-7.136129	0.0000
D(LOGIPol(-1))	30.63427***	3.938172	7.778805	0.0000
D(LOGIPol(-2))	20.47272***	3.416607	5.992122	0.0000
D(LOGIPol(-3))	13.05225***	3.037279	4.297351	0.0007
D(INF)	-0.107890***	0.026683	-4.043390	0.0012
D(LOGAGPRO)	-42.40572***	5.060073	-8.380456	0.0000

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CointEq(-1)*	-0.971080***	0.076276	-12.73119	0.0000
R-squared	0.977324	Adj. R-squared	0.955983	
F-statistic	45.79412	Durbin-Watson	2.547924	

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%.
Source: Author's Computation (2026).

➢ *Diagnostic Tests*

The test results for Model 1 are summarised in Table 6. The Breusch-Godfrey Serial Correlation LM test indicates that the residuals do not contain serial correlation at the 5% significance level: 2 lags have an F-statistic of 1.297 (p-value of 0.309); 4 lags have an F-statistic of 1.390 (p-value of 0.306). The heteroskedasticity test gives a value of 0.382 for the F statistic with a probability of 0.002, which is cause for caution.

The CUSUM and CUSUM of Squares test statistics are staying within their 5% critical bound throughout the sample period, indicating the stability of the parameters and no structural breaks in the estimated relationship between industrial policy and structural transformation between 1986 and 2023.

Table 6 Diagnostic Tests

Test	F-statistic	Prob. Value	Remarks
Serial Correlation LM Test (2 lags)	1.297324	0.3090	No serial correlation
Serial Correlation LM Test (4 lags)	1.389720	0.3056	No serial correlation
Heteroskedasticity Test	0.382305	0.0019	No heteroskedasticity
CUSUM	Within critical bounds at 5% — stable		
CUSUM of Squares	Within critical bounds at 5% — stable		

Source: Author's Computation

D. Model 2: Trade Openness and Structural Transformation

➢ *Cointegration Results*

The results of the bounds test for Model 2 are shown in Table 7. The computed F value is 11.03190, with the number of regressors (k = 3) far larger than the upper bound critical values 10%, 5%, 2.5% and 1%, which are 4.45, 5.07, 5.62 and 6.36, respectively. The null hypothesis of no cointegration is rejected, and a strong long-run equilibrium relationship between the variables under study is established. The values of the F-statistic exceed significantly by a factor of 2 the upper bound critical value, which is strong evidence of cointegration.

Table 7 ARDL Bounds Test

Bounds Test Result		
F-statistic	11.03190	
No. of Regressors (K)	3	
Pesaran et al. (2001) Critical Values		
Significance	**I(0) Lower Bound**	**I(1) Upper Bound**
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

Source: Author's Computation (2026).

➢ *Long-Run and Short-Run Estimates*

Table 8 presents the long-run coefficient estimates for Model 2. Trade openness (TO) registers a negative but statistically insignificant long-run coefficient (β = -0.302; t = -0.300; p = 0.7693). This null result implies that, over the 1986–2023 study period, trade liberalisation policies have neither significantly accelerated nor impeded structural transformation in Nigeria in the long-run. The finding is a verdict of complete policy ineffectiveness: despite the SAP's radical tariff reductions, the EEG export incentive scheme, and Nigeria's accession to AfCFTA, trade openness has failed to generate the anticipated sectoral reallocation of resources from agriculture to manufacturing.

This result is more extreme than the adverse effects of trade openness found by Adegoke et al. (2020) and Chabi and Saygılı (2024), as it indicates not even a significant negative effect but a total absence of structural impact.

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Table 8 Long-Run Estimates

Dependent variable: Structural Transformation (ST)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	247.8715	42.19661	5.874205	0.0001
@TREND	8.563202	1.514596	5.653785	0.0001
TO	-0.301634	1.005377	-0.300021	0.7693
INF	0.032940	0.076514	0.430513	0.6745
LOGAGPRO	-105.1653***	5.518865	-19.05560	0.0000

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%.
Source: Author's Computation (2026).

In Model 2, the effect of agricultural productivity (LOGAGPRO) is again significant and negative (β = -105.17; t = -19.06; p = 0.0000), but the magnitude of the coefficient is slightly smaller, compared with Model 1 (-105.17 versus -129.98). The stability of the result in both model specifications indicates a strong structural constraint on Nigeria's manufacturing-led transformation, and this constraint is the inertia in the agricultural sector, rather than the orientation of trade policy. Inflation (INF) is again positive but insignificant in the long-run.

The ECM estimates are shown in Table 4.9 for Model 2. The CointEq(-1) coefficient of -1.444243 is negative and statistically significant (t = -7.427; p = 0.0000), and suggests that about 144.4% of the disequilibrium in structural transformation is eliminated after one year. An adjustment rate greater than 100% suggests oscillatory correction, that is, the system overshoots the equilibrium and oscillates about it before settling back to the equilibrium, indicating the high degree of structural volatility in the Nigerian economy. In the short-run, trade openness generates positive effects on structural transformation with increasing strength at two and three lags (β = 7.64 and β = 7.41, respectively), though these beneficial short-run impulses fail to consolidate into meaningful long-run structural change.

Table 9 Error Correction Model Estimates

Dependent Variable: Structural Transformation (ST)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(TO)	1.310021*	0.726918	1.802157	0.0967
D(TO(-2))	7.642330***	1.945427	3.928356	0.0020
D(TO(-3))	7.411032***	2.475892	2.993278	0.0112
D(INF)	-0.133195***	0.042266	-3.151310	0.0084
D(LOGAGPRO)	-51.79276***	7.784995	-6.652896	0.0000
CointEq(-1)*	-1.444243***	0.194460	-7.426943	0.0000
R-squared	0.954907	Adj. R-squared	0.903801	
F-statistic	18.68497	Durbin-Watson	1.917866	

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%.
Source: Author's Computation (2026).

➢ *Diagnostic Tests*

The results of the diagnostic test for Model 2 are shown in Table 10. The Breusch-Godfrey LM test gives F-statistics of 2.413 and 1.212 for 2 and 4 lags, respectively (p-values of 0.140 and 0.377), which indicate no evidence of serial correlation at the 5% level. An F-statistic of 0.654 and a probability of 0.806 suggest that homoskedasticity is not rejected in the heteroskedasticity test, and the test results are consistent with the presence of constant residual variance. The CUSUM plot and the CUSUM of Squares plot of both statistics stay within 5% critical bands for the entire period of the study, indicating the stability of the estimated trade-openness-structural-transformation relationship over time.

Table 10 Diagnostic Tests

Test	**F-statistic**	**Prob. Value**	**Remarks**
Serial Correlation LM Test (2 lags)	2.413074	0.1396	No serial correlation
Serial Correlation LM Test (4 lags)	1.211884	0.3772	No serial correlation
Heteroskedasticity Test	0.654173	0.8061	No heteroskedasticity
CUSUM	Within critical bounds at 5% — stable		
CUSUM of Squares	Within critical bounds at 5% — stable		

Source: Author's Computation (2026).

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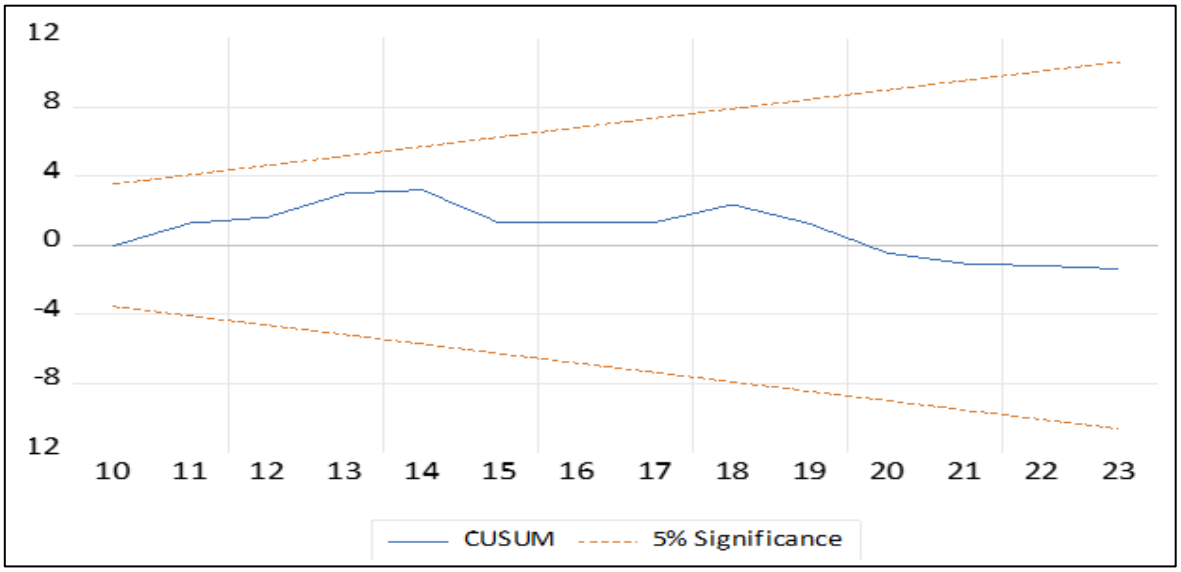

Fig 1a CUSUM Stability Test for the Model

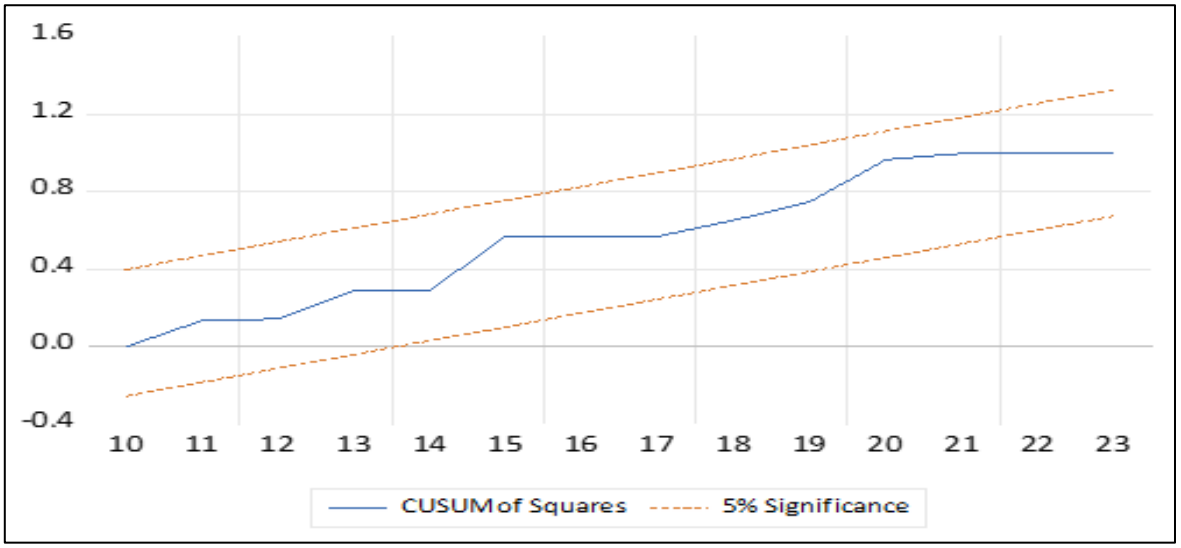

Fig 1b CUSUM of Squares Stability Test for the Model

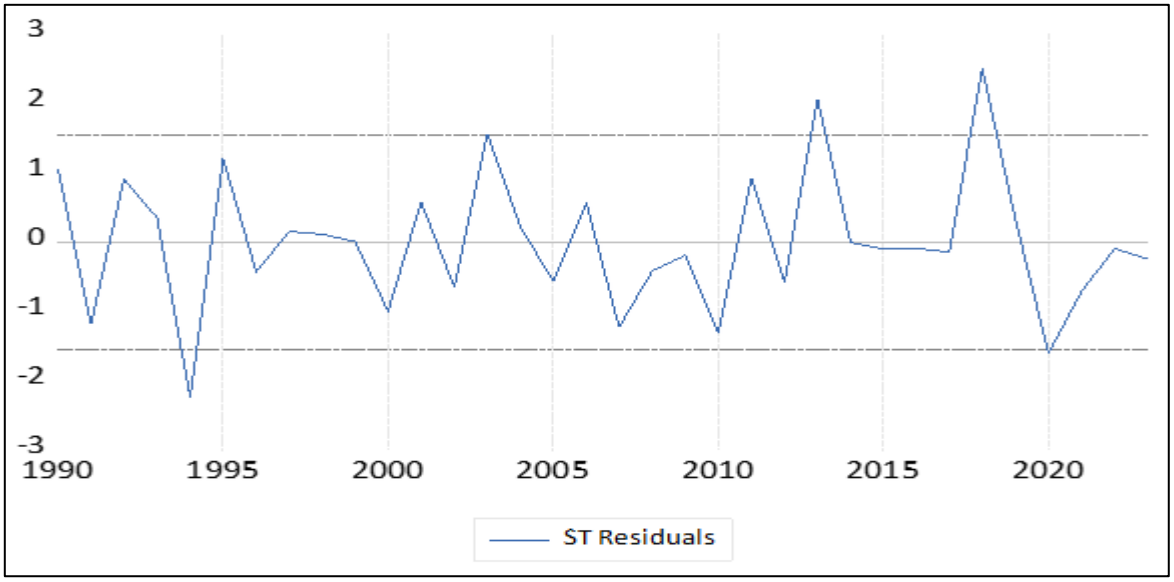

Fig 2a ST Residual Curve
Source: Author's Computation, 2026

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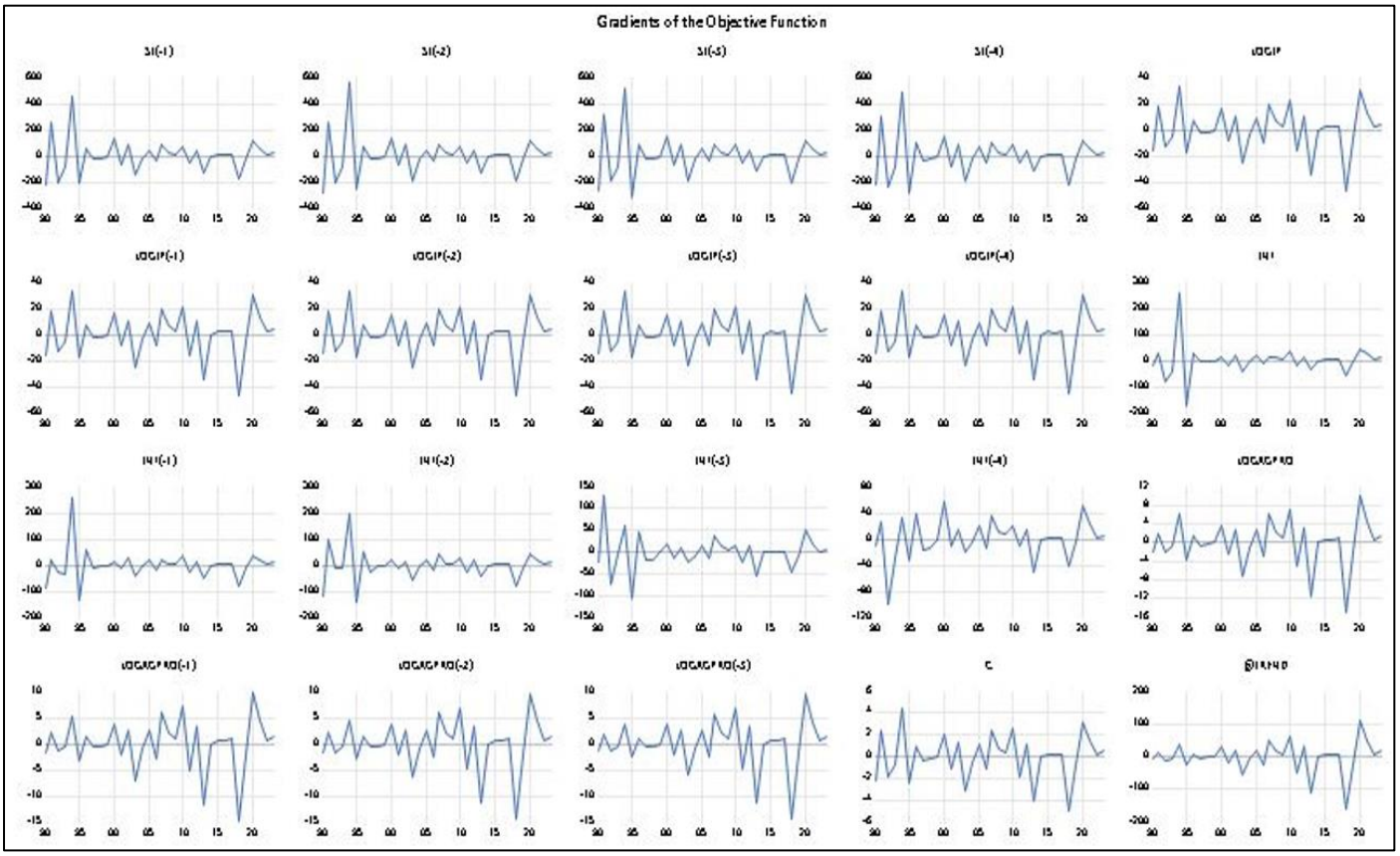

Fig 2b Gradient Curves for the Model
Source: Author's Computation, 2026

VI. DISCUSSION

➢ *Industrial Policy: A Paradox of Counter-Productive Intervention*

The major negative long-term effect of industrial policy on structural transformation in Nigeria is the most eye-catching result of this study, which requires careful interpretation. This is in contrast to positive results documented by Krueger (2020) and Bakre and Ojugbele (2020) in the East Asian economies that adopted specific industrial policies and had a positive outcome on industrial growth and structural change. It, however, broadly corroborates Akinlo et al. (2021), Madichie et al. (2018), and Omotayo and Odeleke (2022) on the ineffectiveness of industrial policies in Nigeria, with the latter reporting a larger negative effect than the present study.

Several mechanisms may account for the perverse long-run relationship. First, the chronic inconsistency of Nigeria's industrial policy framework, with frequent reversals across administrations, inadequate funding, and absence of performance-linked conditionalities, has eroded investor confidence and discouraged sustained investment in manufacturing (Abiola et al., 2019). Second, rent-seeking behaviour in the allocation of industrial subsidies has diverted resources away from productive manufacturing activities towards politically connected firms with limited transformative capacity (Ogunleye, 2017). Third, the absence of complementary investments in infrastructure, human capital, and energy supply has meant that even well-intentioned subsidies cannot generate the productivity gains necessary to attract labour and capital from agriculture (Andreoni et al., 2021). The NIRP's failure to raise manufacturing's GDP contribution beyond 9% despite targeting 12% by 2018 exemplifies this pattern.

The positive short-run lagged effects of industrial policy (especially at lags one to three) indicate that policy injections do generate temporary stimuli to structural transformation, but these are insufficient to alter the long-run trajectory. This asymmetry between short-run impulses and long-run outcomes is characteristic of policy environments where implementation capacity and institutional coherence are weak, conditions that are well documented in Nigeria's political economy (Omoke & Opuala-Charles, 2021).

➢ *Trade Openness: Ineffective Rather than Destructive*

The null long-run effect of trade openness on structural transformation, insignificant across all conventional significance levels, is itself a revealing finding. It suggests that Nigeria's trade policy environment has produced a structural impasse: trade liberalisation has neither catalysed the expected industrial upgrading predicted by neo-liberal theory (Larner, 2000) nor generated the severe deindustrialisation documented in studies of more aggressively liberalised economies (Gandjon-Fankem & Feyom, 2024). Instead, the economy appears to have settled into a state of structural stasis in which trade policy cannot penetrate the entrenched sectoral rigidities.

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This is in line with the labour mobility restrictions suggested by the consistently large and negative long-run coefficients on agricultural productivity in both model specifications. However, even in the event of overall agricultural productivity growth, the agricultural sector is not able to keep workers and equipment, thereby blocking the movement of resources into manufacturing that trade liberalisation was intended to promote. According to McMillan, Rodrik, and Verduzco-Gallo (2013), there are two conditions for structural transformation: first, market openness, and second, a lack of factor market distortions and absorptive capacity is required in the receiving industry.

This positive short-run effect, with lags of between two and three years, indicates that some positive effects can be felt from trade openness, perhaps due to competitive pressures that encourage short-run productivity measures, but the effects do not materialise as lasting structural change as was hoped. This is a new piece of evidence that trade openness in low-income resource-intensive economies does not automatically come with the same structural results as the standard trade theory envisions, but it needs support from complementary industrial policies and institutional changes (Kaba et al., 2022; Lin, 2011).

VII. CONCLUSION

This study used both distinct ARDL specifications, thus separating the long-run and short-run effects of industrial policy and trade openness on structural change in Nigeria during 1986-2023. The key findings are as follows: Industrial policy has a negative long-run effect on structural transformation ($\beta = -38.49$; $p<0.01$), suggesting that policy measures have been adverse to structuring the economy based on manufacturing in the period of this study. No significant long-run impact suggests that trade openness has no impact on structural transformation due to trade liberalisation. Agricultural productivity is seen to have a steady negative long-run impact in the two model specifications, thus showing that agricultural sector inertia is the key structural constraint for transformation in Nigeria. Industrial policy and trade openness have positive transient impacts, but in the short-run these are not enough to counter long-run structural rigidity in the economy.

The results have significant policy implications. Nigeria is in need of a total reengineering of its Industrial Policy framework to begin with. This study documents implementation failures, which could be remedied by establishing a politically independent Industrial Policy Coordination Agency, with proper funding, and with performance-based conditionalities that are enforceable. All industrial policy instruments should be challenged regularly and be subject to sunset provisions based on tangible transformation targets. Second, trade policy should follow industrial capacity development, not be a trade policy that stands alone. There should be a Trade and Industrial Policy Integration Council to ensure the liberalisation timetable dovetails with industrialisation needs in the country and that the exposure to the global market is not at the expense of the fledgling industrial base. Third, the dominant role of agricultural productivity as a constraint to transformation requires targeted interventions, such as the implementation of mechanisation programmes, development of agro-processing value chains and reform of the agricultural labour market, to shift agricultural productivity from being a constraint to transformation to its role in the structural transformation.

The study is one of a kind in the literature because it offers the first symmetrical dual modelling ARDL analysis of the independent effects of industrial policy and trade openness on structural transformation in Nigeria during the entire industrial policy cycle of 1986-2023. More studies are needed on the mediating effect of institutional quality and macroeconomic stability on the link between industrial policy and trade openness, as complementary policy instruments for structural change.

- *Author Contributions, Acknowledgements, Conflicts of Interest*

- Corresponding Author carried-out the analysis and wrote the manuscript
- Affiliation 1: Proofread and corrected the manuscript
- Affiliation 2: supplied data and interpreted results

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